ESL-IC-08-10-35a

Ein Kooperationsvortrag von

Office Buildings: Developer's Requirements – Consultant's Solutions

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8. Kongress für Gebäude- und Betriebsoptimierung - ICEBO'08

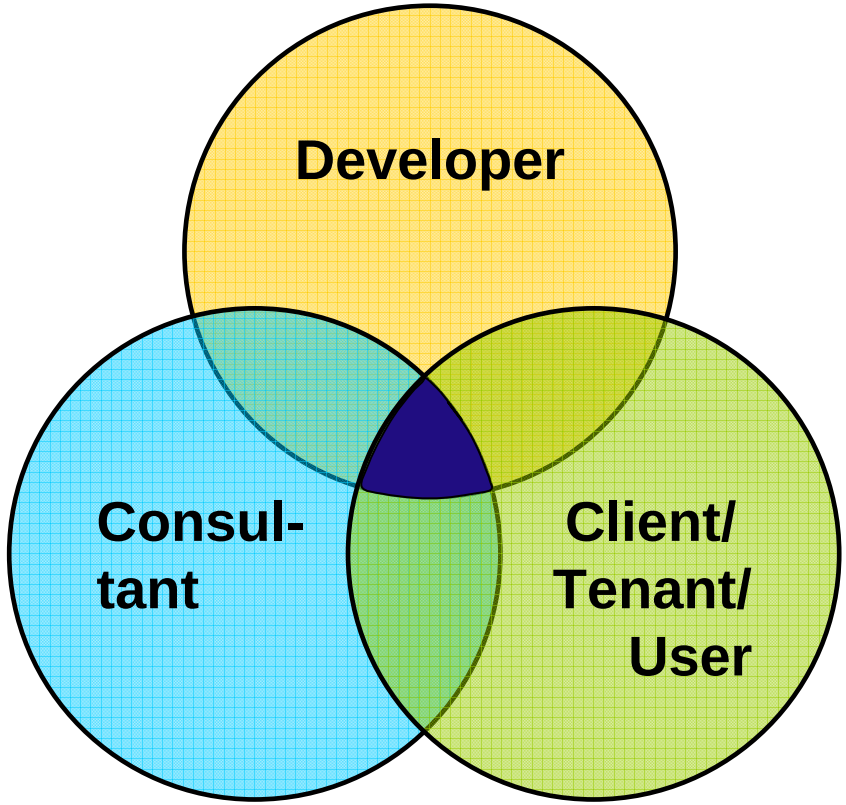
October 20/21/22 2008

Proceedings of the Eighth International Conference for Enhanced Building Operations, Berlin, Germany, October 20-22, 2008

The “amount“ of sustainability integrated in to projects is the intersection of different interests

Developers and Consultans are key-players when sustainability is introduced to projects

Parties



Interests

Developer/Investor

- Market-oriented products – including sustainability

Consultant

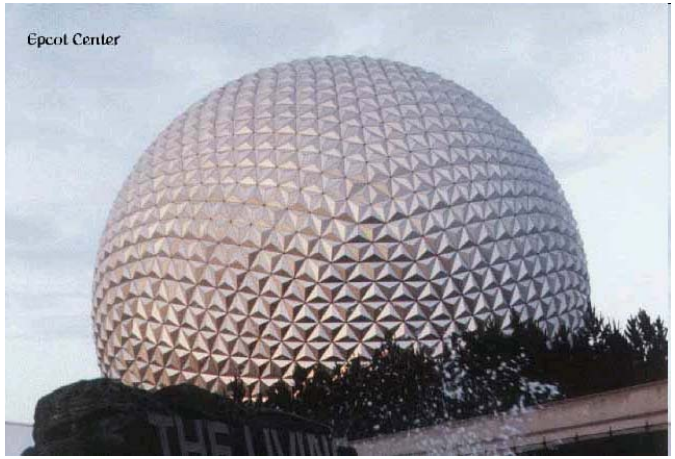
- Integrated solutions
- Technical possibilities

Client/Tenant/User

- Individual requirements
- Efficiency of rent & operating costs

Which options do we have for sustainable building design

Passive means



Building shape and orientation

Minimization of relation between surface area and volume

Quelle:
Epcot Center www.geocities.com
Jüdisches Museum Berlin © Mahs/Ebert

Which options do we have for sustainable building design

Passive means

Green roof

Natural Shading by plants

Natural cooling by condensing water

Quelle

Technisches Rathaus Müchen, Photo by Matthias Sebulke

Which options do we have for sustainable building design

Passive means

Sustainable material (e.g. wood, clay, corc..)

Natural daylight

Shading instead of cooling

Thermal Insulation

Reduction of indoor temperatures

Quelle:

PE INTERNATIONAL

Which options do we have for sustainable building design

Active means

Photovoltaic cells

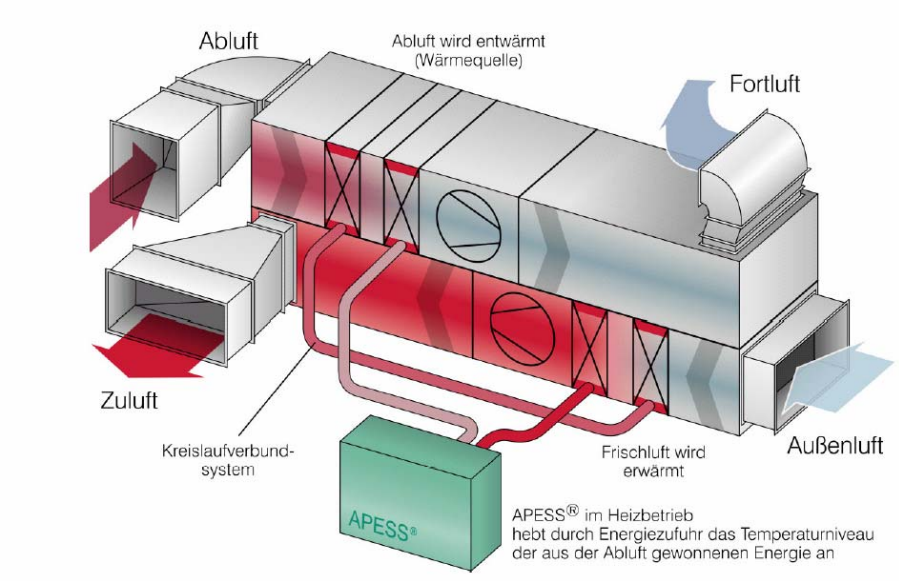
Solar collectors

Quelle:

Fraunhofer ISE

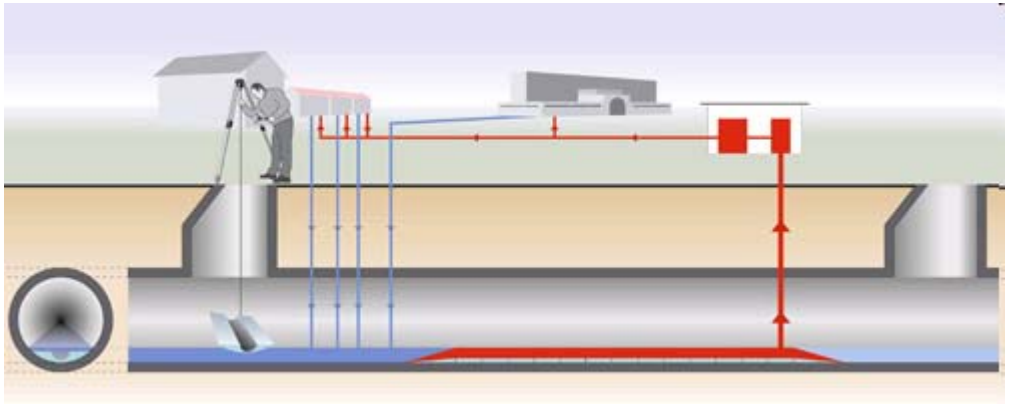
Which options do we have for sustainable building design

Active means



Highly efficient heat recovery

Heat recovery from foul water



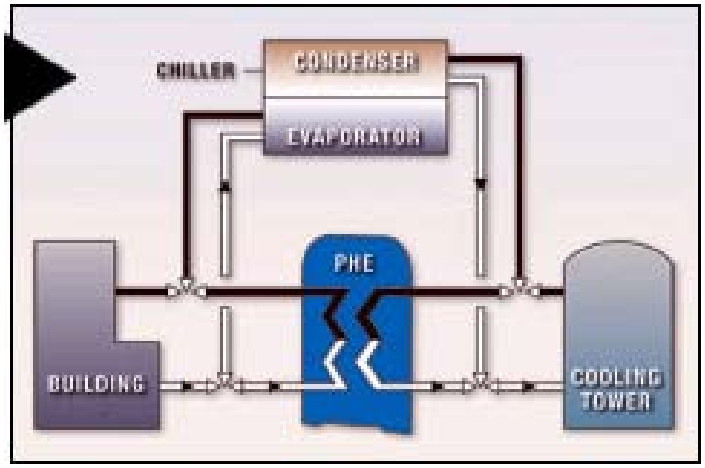
Quellen:

Ingenieur- und Gutachterbüro Schulz

Air 2000 GmbH
Heusenstammer Str. 27-29
D-63179 Obertshausen

Which options do we have for sustainable building design

Active means



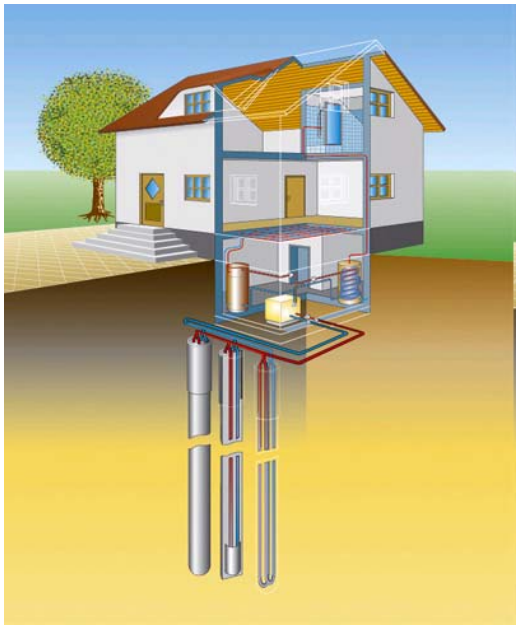
Free Cooling

Rain water usage

Quelle:
Polaris Plate Heat Exchangers
Fa. HSSE-Haustechnik GmbH

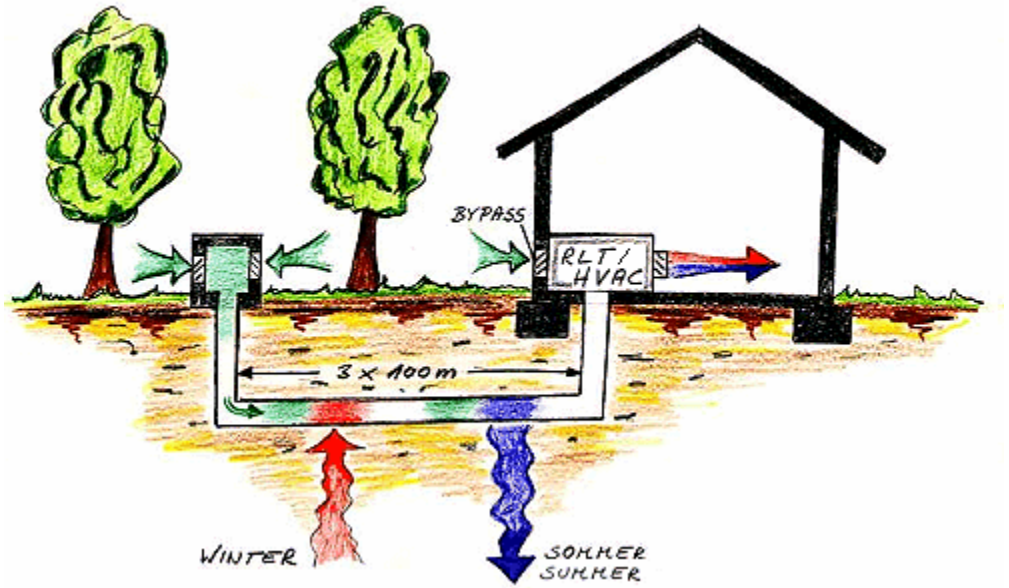
Which options do we have for sustainable building design

Active means



Geothermal energy & heat pump

Pre-heating/cooling through earth channel

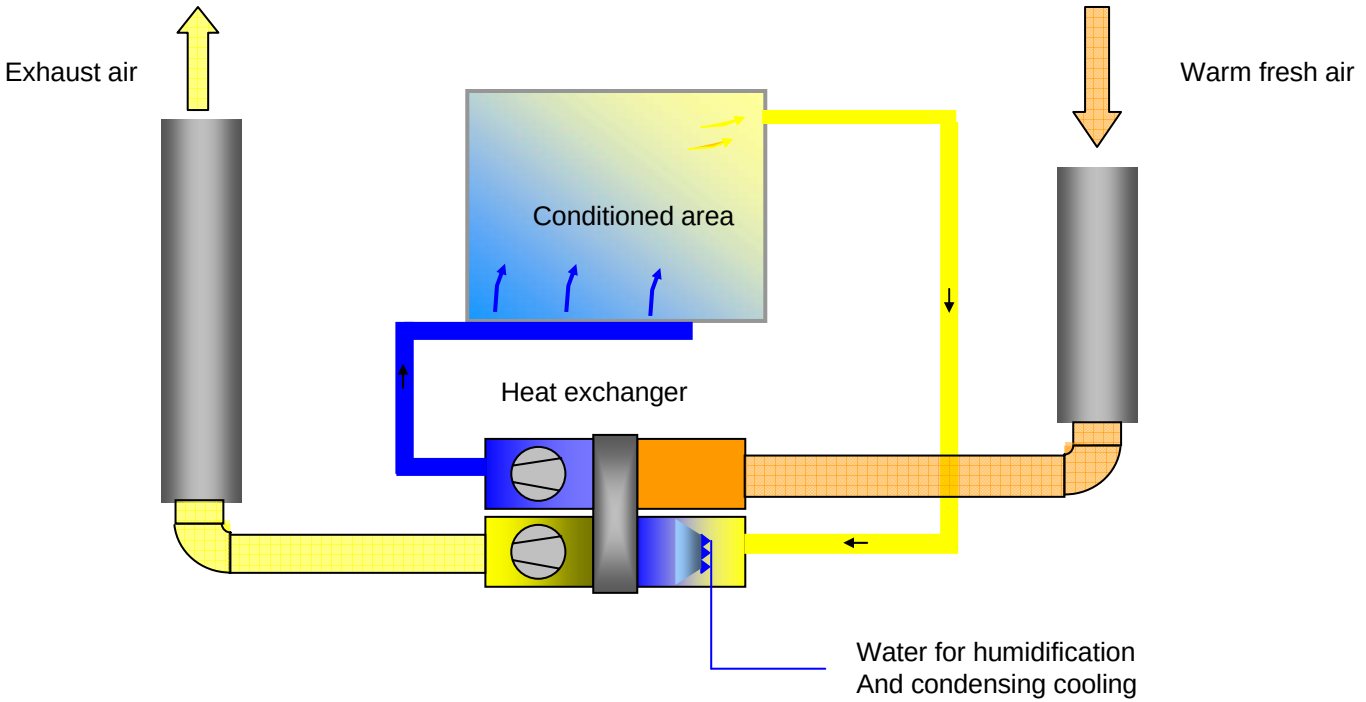


Quelle: **Gahm Haustechnik GmbH**

IGH Ingenieurgesellschaft
Höpfner mbH

Which options do we have for sustainable building design

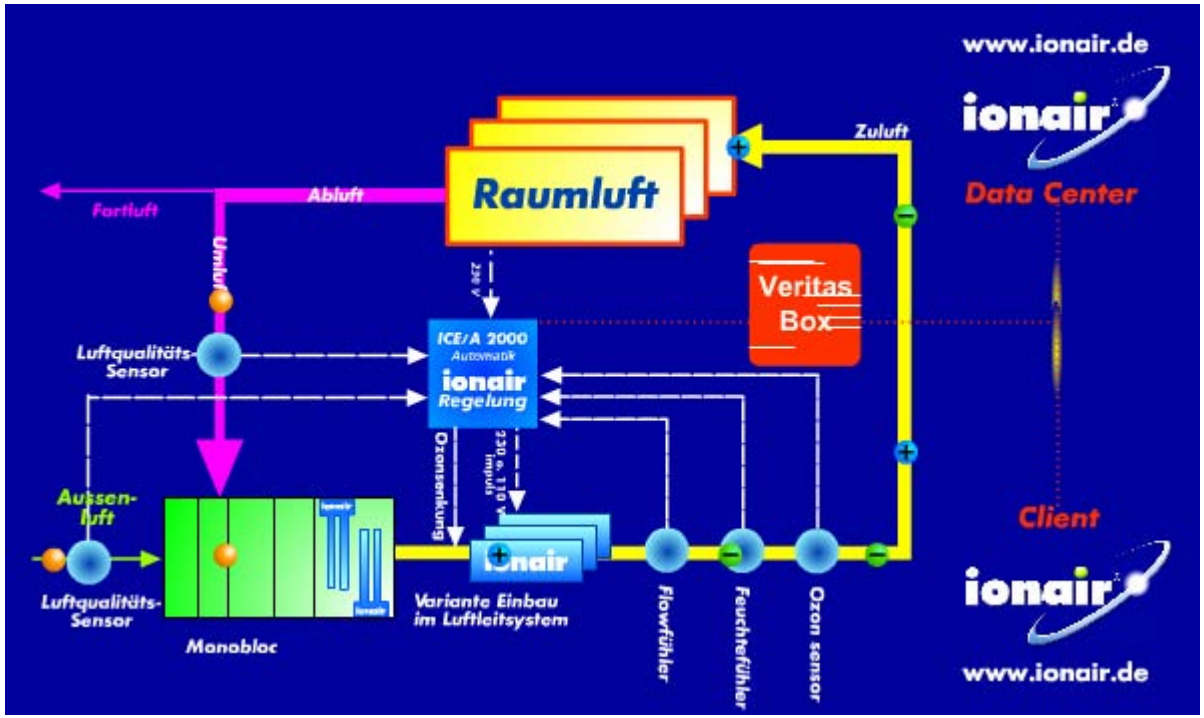
Active means



Condensing cooling in air handling units

Which options do we have for sustainable building design

Future developments

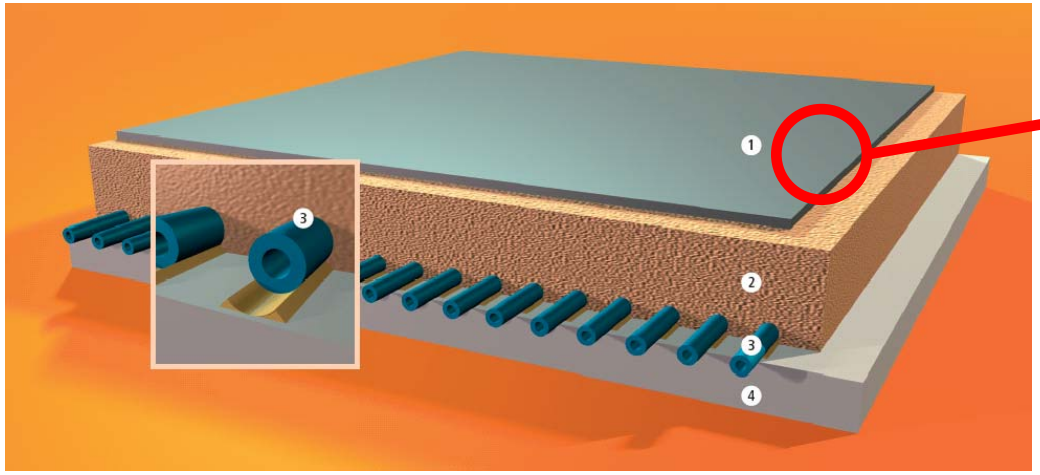


Reduction of fresh air volumes by air treatment

Quelle:
LK LUFTQUALITÄT AG
Staldenhof 3A / CH-6014 Littau / Switzerland

Which options do we have for sustainable building design

Future developments



Usage of phase change material (PCM) to increase the buffer capacity of the building

Quelle:

ILKAZELL
Isoliertechnik GmbH Zwickau

Which options do we have for sustainable building design

Future developments

Vacuum insulation

Kühlen mit Kunststoff

Eine Forschungsgruppe der Pennsylvania State University hat Spezialpolymere entwickelt, die sich abkühlen, wenn eine elektrische Spannung angelegt wird. Dieser so genannte elektrokalorische Effekt beruht auf einer Veränderung der Struktur der Molekülketten. Ohne Stromfluss sind die Moleküle zufällig angeordnet und weisen daher eine relativ geringe Ordnung auf. Beim Anlegen einer elektrischen Spannung richten sich die Moleküle gleichmäßig aus. Durch diese Veränderung geben sie Wärme ab und werden dadurch kühler.

Cooling with polarpolymeres

Quellen: Fraunhofer ISE

Science 8 August 2008:
Vol. 321. no. 5890, pp. 821 - 823
DOI: 10.1126/science.1159655

The motivation for sustainability originates from different causes

The following four causes of motivation will be discussed in this lecture

Sustainability comes to the forefront when:

- **… it reduces investment and operating costs (significantly)**
- **… it helps market the building/property**
- **… it improves the image of the investor**
- **… it is required by regulations**

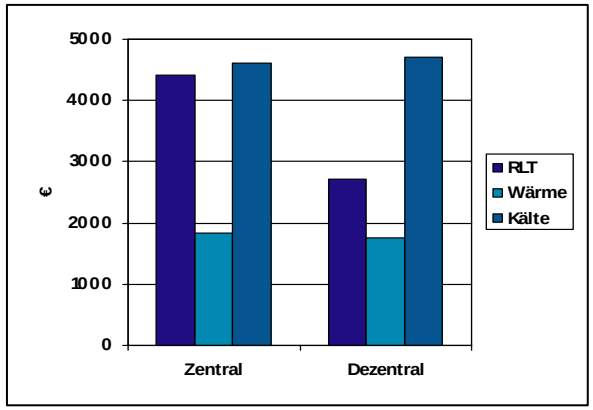
The decision of investor / client on which system to choose is based on one hard fact: cost!

Sustainability is successfull when it reduces the costs significantly

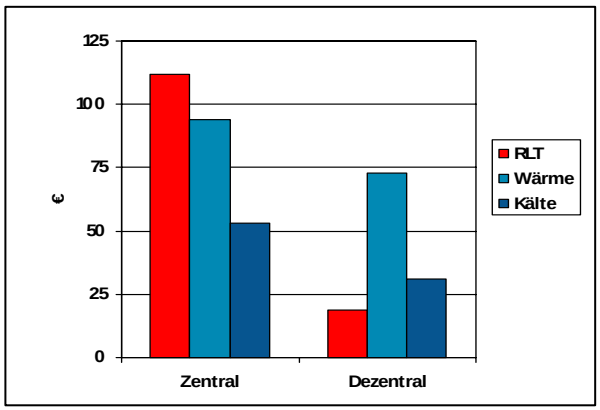
Decisions on technical systems are made with regards to:

- **Minimum investment costs**
- **High space efficiency**
- **Low energy cost and operating costs**
- **Optimised maintenance costs**

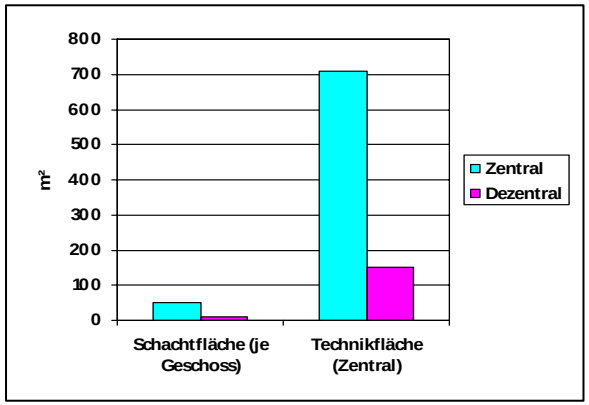
INVESTMENT COSTS*



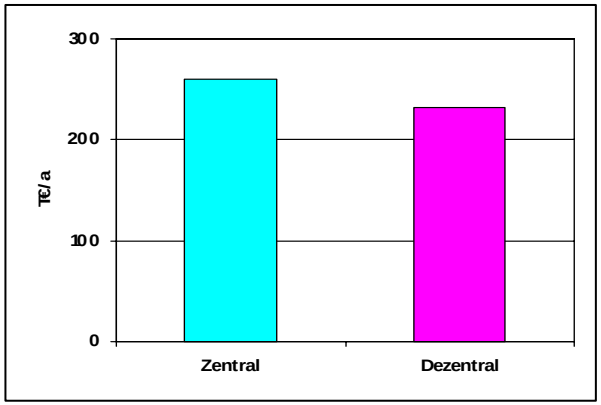
ENERGY COSTS*



SPACE EFFICIENCY (to let)*



MAINTENANCE COSTS*

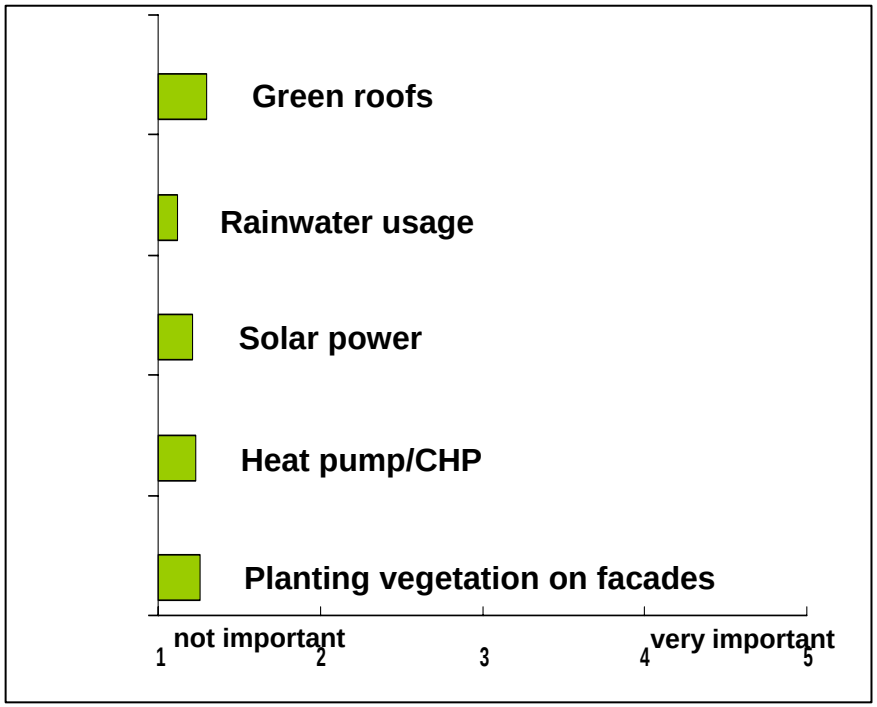


*Sample shows basis of decision between two ventilation system of Tower 1, Frankfurt

Sustainability is “in” – until recently our typical tenant had no great interest in ecological aspects

Sustainability helps market the building

Required ecological aspects for an office building (based on study 2003/2004) *



- Within the group of general office users ecological aspects do (did) not have a high importance
- Market view has changed rapidly, “green issues ” are desired
- New “European directive on energy performance of buildings” has/will focus developers and tenant’s view on energy consumption of properties

*Source: DTZ Consulting & Research GmbH

Vivico has always shown a great commitment to sustainability

Sustainability comes into account when it improves the image of the investor

Vivico projects incorporate sustainability:

- **VELUM, Munich (2004/2007)**
  Geothermal energy systems
- **Rhein Traidem, Cologne (2005)**
  Official pilot for EnEV-Certificate
- **ATMOS, Munich (2006/2008)**
  Comprehensive sustainability criteria from design to fit-out
- **Tower 185, Frankfurt (2007/ 2010-11)**
  LEED-Rating
- ***MK9 LSQ, Berlin (2008)***
  Sustainable Concepts & LEED-Rating

MK9 – Sustainable building design

Passive means

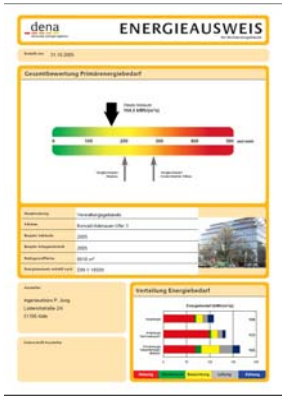
- Optimized building shape
- High efficient double facade
- Natural ventilation
- high daylight factor through internal atrium and facade
- Natural ventilation
- Investigation of PCM material

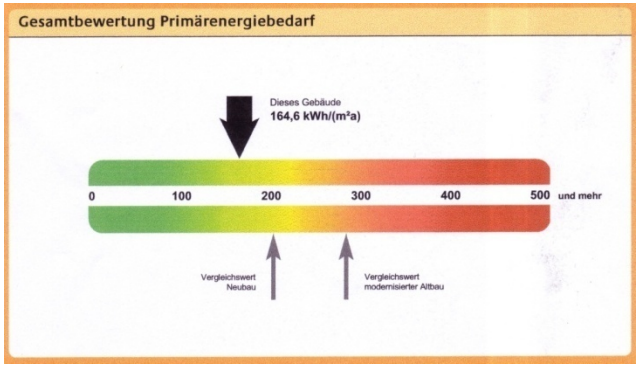
Active means

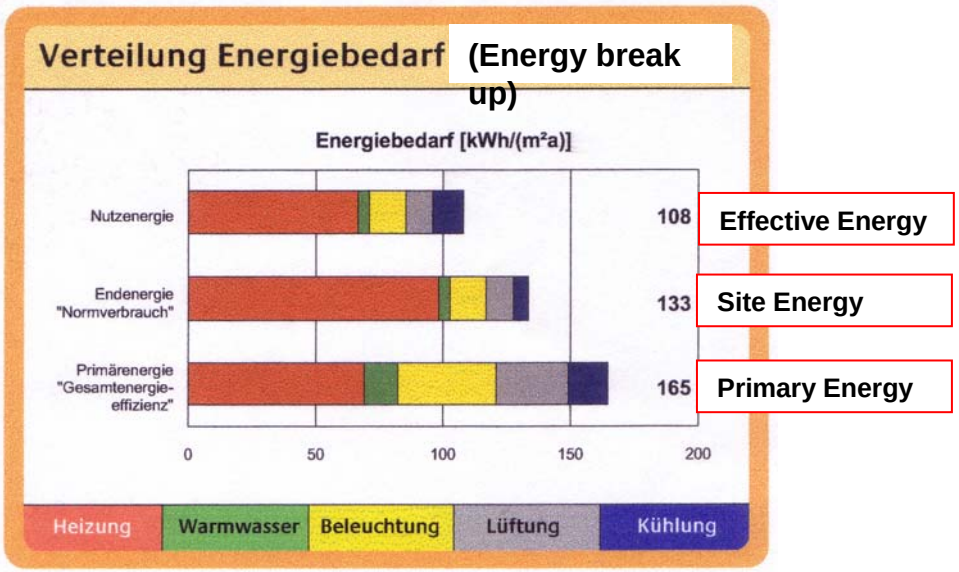
- Free cooling
- Highly efficient heat recovery
- Condensing cooling in air handling units
- Rain water usage
- Low energy lighting
- Fully integrated BMS
- District heating generated by combined heat and power plant

How to analyse the Energy Performance Certificate (EnEV) from an investors point of view

Sustainability is relevant when it is required by regulations







(Energy break up)

Effective Energy

Site Energy

Primary Energy

Governments focus lies on primary energy

- Primary energy (i.e. district heating) is dependant on local utility company
- Absolute value has no meaning to client and allows no comparison between buildings

Investors focus lies on site energy (secondary energy)

- Effective energy often driven by usage/quality (i.e. client) and by architecture
- The proportion between effective energy and site energy indicates the degree of commitment to sustainability
- Site energy is the closest indicator to operating costs

What detracts investors from committing themselves more heavily to sustainability?

MORE sustainability features could be included if current problems were overcome

Legal requirements

- **German building regulations and DIN standards define temperature requirements (i.e. max. 26°C in offices in summer)**
  - **Non compliance can lead to rent reduction or lease termination**

Contractual requirements

- **Tenancy agreements often fix room conditions**
  - **Provision of overcapacity required**

Inexperience with new systems

- **To attract new tenants investors are often forced to commit themselves to a cap on operating costs**
  - **Inexperience with innovative systems make prediction difficult**

Thank you very much for your attention

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